COST ESTIMATES

8.1 INTRODUCTION

The Chino Desalter Phase 3 project will require construction of new facilities and, and under some options, purchase of capacity in the SARI pipeline and treatment system. Construction of new facilities will result in changes to the annual operation and maintenance (O&M) costs of the CDA. There are also cost offsets, such as the reduction in capital costs through use of grant funding and the reduction in O&M costs through programs provided by agencies such as MWD and Chino Basin Watermaster.

This section presents estimates of both capital and O&M costs associated with the Chino Desalter Phase 3 project as well as the impact of grant funding and O&M cost reduction programs. A proposed allocation of capital costs between the project Sponsors as well as between non-Sponsor CDA members is presented. The effects of changes to the annual cost of water to the CDA annual budget are also shown.

It has been proposed that the project Sponsors will pay a “buy-in” cost to original CDA members for use of capacity in existing CDA facilities. Buy-in cost analysis is presented separately and not included in this report.

8.2 SARI COSTS

There are two components of SARI costs: pipeline costs and treatment costs. Pipeline costs represent the capacity acquired in the SARI pipeline system and treatment costs represent capacity in the OCSD water reclamation facility and ocean outfall. All SARI pipeline capacity was sold in 1997 at a price set by SAWPA Resolution No. 295. SARI treatment capacity is typically acquired when needed and costs are based on the current replacement value charged by OCSD through SAWPA. A summary of historical SARI treatment and pipeline capacity costs is shown in Table 8.1.

Using the historical SARI pipeline capacity cost of $3,750,000 per mgd and the current SARI treatment replacement cost of $11,332,000 per mgd the capital costs of SARI capacity are presented in Table 8.2 for the capacity requirements discussed in Section 5.

Table 8.1 Historical SARI Treatment and Pipeline Capacity Costs
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Date	Pipeline Capacity Cost ($ per mgd)	Treatment Capacity Cost[a] ($ per mgd)	Total ($ per mgd)
SAWPA Resolution No. 295	Jul 1997	3,750,000	–	–
IEUA Phase 2 Sale to CDA[b]	May 2004	3,750,000	3,100,000	6,850,000
2006 SAWPA Business Plan	Jun 2006	3,750,000	4,284,029	8,034,029
SAWPA Resolution No. 487	Sep 2007	–	4,547,250	–
Current New [c]	Aug 2009	–	11,332,000	–

Notes:
a. Brine only discharge.
b. CDA Board Meeting Memorandum dated May 11, 2004.
c. Telephone conversation with David Ruhl, Program Manager, SAWPA (8/6/09) and confirmed by Rich Haller, SAWPA Executive Manager of Engineering and Operations (telephone conversation 10/31/09).

The Chino I Desalter currently has excess SARI capacity; however, the addition of RO treatment trains to meet nameplate capacity will require the purchase of additional SARI capacity for Chino I.

The existing Chino II Desalter has a small amount of surplus SARI pipeline capacity (0.02 mgd) but has a SARI treatment deficit of 0.30 mgd, which is currently covered by temporary use of IEUA's SARI treatment capacity (see Section 5.3 for additional information). The Phase 3 project Sponsors will purchase the surplus pipeline capacity as part of in the facilities buy-in. The original CDA member agencies must purchase 0.3 mgd of SARI treatment capacity at current replacement rates.

The Phase 3 expansion (without concentrate reduction) will increase the required Chino II SARI capacity by 1.73 mgd. The Sponsors must purchase this entire treatment capacity in the SARI system at current replacement costs but the pipeline capacity purchase requirement is reduced to 1.71 mgd by the surplus (0.02 mgd) purchased by the Sponsors from the CDA as part of the buy-in.

In addition to the one-time capital costs for SARI pipeline and treatment capacity, there are monthly volumetric and use charges for operation and maintenance of the SARI system. The SARI volumetric and use charges are included in the Chino Desalter O&M budgets as variable costs. For the record, the current monthly charges are shown in Table 8.3.

Table 8.2 Summary of SARI Capital Costs
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Required SARI Capacity (mgd)	SARI Pipeline Capacity			SARI Treatment Capacity			Total (Credit) or Cost ($)
		Ownership (mgd)	(Surplus) or Deficit (mgd)	(Credit) or Costa ($)	Ownership (mgd)	(Surplus) or Deficit (mgd)	(Credit) or Cost [b] ($)	
Chino I Desalter [a]		CDA	CDA	CDA	CDA	CDA	CDA	CDA
Existing	2.00	2.05	(0.05)		2.05	(0.05)		
Modified (14.2 mgd)	0.94	0.05	0.89	$3,337,500	0.05	0.89	$10,085,480	$13,422,980
Chino II Desalter [c]		CDA	CDA	CDA	CDA	CDA	CDA	CDA
Existing (Buy-in)	1.60	1.62	(0.02)	($75,000)	1.3	0.30	$3,399,600	$3,324,600
		Sponsors	Sponsors	Sponsors	Sponsors	Sponsors	Sponsors	Sponsors
Expansion	1.73	0.02	1.71	$6,412,500	0.00	1.73	$19,604,360	$26,016,860

Notes:
a. SARI pipeline capacity at $3,750,000 per mgd.
b. SARI treatment capacity at $11,332,000 per mgd.
c. For Chino I SARI requirements see Table 5.2; For Chino II SARI requirements see Table 5.3.

Table 8.3 Current SARI Volumetric and Use Charges Chino Desalter Phase 3 PDR JCSD/Ontario/WMWD

Fiscal Year	Flow/mgd[a]	BOD/1,000 lbs.[b]	TSS/1,000 lbs.[c]	Fixed Pipe[d]	Fixed Treatment[e]
2009-10	$850	$283	$420	$2,581	$6,452
2010-11[f]	$891	$312	$462	$2,710	$6,775
2011-12	$862	$343	$508	$3,440	$7,890

Source: Table and footnotes are from SAWPA Commission Resolution No. 513, May 12, 2009. Updated for FY 2011-12 from Resolution No. 2010-07, dated April 20, 2010.

a. This component shall be calculated and assessed per gallon (i.e., $0.000850 in FY 2009-10) of discharge (flow) to the SARI System each month.
b. This component shall be calculated and assessed per pound (i.e., $0.2836 in FY 2009-10) of dry weight of BOD calculated from the average of sample results each month.
c. This component shall be calculated and assessed per pound (i.e., $0.420 in FY 2009-10) of dry weight of TSS calculated from the average of sample results each month.
d. This component for fixed costs (also known as Readiness to Serve) shall be assessed per mgd of owned pipeline/connection capacity per month.
e. This component for fixed costs shall be assessed per mgd of owned treatment and disposal capacity per month.
f. Future rate for planning purposes only. The Commission will separately evaluate and set the rates annually for each FY.

8.3 CAPITAL COSTS

The scope of the Phase 3 project includes expansion of Chino II by 10.5 mgd in order to increase total desalter raw water usage to 40,000 AF/yr. At the same time, the Phase 3 project should not result in a reduction in reliability of delivery of current entitlement volumes to the non-Sponsor CDA members. Three basic options for expansion of Chino II without impairing the delivery of current entitlements are outlined below.

8.3.1 Option A—Expand Chino II to 20.5 mgd and Modify Chino I to Nameplate Capacity

This option would result in 20.5 mgd capacity at Chino II and 14.2 mgd capacity at Chino I. Assumptions include the following:

- Desalter Capacity
  - Chino II is expanded from 10 to 20.5 mgd capacity by expanding the IX capacity from 4 to 8 mgd and expanding the RO capacity from 6 to 12.5 mgd.

- Raw water bypass is not included in the 20.5 mgd Chino II capacity but it can be used as part of the capacity to reduce the operating cost.
- The Sponsors purchase the Chino II raw water, on-site, and product water capacity in excess of 10 mgd as part of the buy-in.
- Chino I is modified by addition of up to two RO trains in order to produce at 14.2 mgd capacity and replace the loss of Chino II capacity in excess of 10 mgd.

- Raw Water Capacity
  - Connect the Chino I and Chino II raw water systems:
    - Addition of CCWF makes Wells I-13, 14, and 15 available for use at Chino II.
    - Intertie allows Chino II wells to provide redundancy to Chino I and vice versa.
  - Connecting Chino I wells to the Chino II raw water system may affect the use of the Chino II raw water bypass (because of nitrate impaired wells). This will not affect the product water capacity but could increase the operating cost.
  - Additional Chino II wells (e.g., Wells II-10, 11, and 12) can be added in the future if needed.

- SARI Capacity
  - Chino I requires purchase of an additional $13.42 million of SARI capacity to support the additional RO.
  - Chino II requires purchase of an additional $26.02 million of SARI capacity to support the additional RO.
  - Chino II requires purchase of an additional $3.4 million of SARI capacity to replace the missing 0.3 mgd of SARI treatment capacity that is currently "borrowed" from IEUA to allow operation of the existing Chino II facilities.

- Capital Costs
  - Estimated cost (2009 dollars) of Chino I modification to nameplate capacity is $20.72 million ($7.3 million RO expansion plus $13.42 million SARI capacity).

8.3.2 Option B—Expand Chino II to 22.7 mgd (Including Raw Water Bypass)

This option leaves Chino I at current capacity and expands Chino II by adding 10.5 mgd of RO/IX capacity to the existing 10 mgd RO/IX capacity and the current raw water bypass capacity. Assumptions include the following:

- Desalter Capacity
  - Chino II is expanded from 12.2 to 22.7 mgd capacity by adding 4 mgd of IX and 6.5 mgd of RO to the existing capacity.
  - This option assumes that the existing Chino II capacity is 12.2 mgd, which is the RO/IX capacity (10 mgd) plus the historical average bypass water flow (2.2 mgd).
  - Raw water bypass is included in the 22.7 mgd Chino II capacity and is required in order to meet entitlements.
  - The Sponsors purchase the Chino II raw water, on-site, and product water capacity in excess of 12.2 mgd as part of the buy-in.
  - Chino I is required to produce at 12 mgd capacity (14.2 mgd less 2.2 Chino II raw water bypass capacity) to meet entitlements.
    - In the event that the CCWF increases the Chino I RO/IX raw water TDS a placeholder of $2.44 million (capital cost in 2009 dollars) is included for sufficient RO capacity to maintain the current Chino I product water capacity (see Section 4.3.2).
- Raw Water Capacity
  - Because the Chino II raw water bypass is required to meet entitlements, the Chino I and Chino II raw water systems are not interconnected, in order to eliminate the possibility of nitrate impaired wells impacting the bypass and to avoid increasing the TDS by use of wells CDA I-13, 14, and 15 as part of the Chino II raw water supply.
  - Existing Chino I well production is reduced by the required production of the CCWF.
  - Because of the increased raw water requirement at Chino II, four new Chino II wells are required to maintain the same level of redundancy proposed for Option A (i.e., 70 percent operation factor).
  - Modifications to the Chino II raw water system include extending the raw water pipeline along Bellegrave for additional Chino II wells and installing

additional parallel raw water pipeline because the raw water flow is 2.2 mgd higher than required in Option A.

- SARI Capacity
  - Chino I requires purchase of an additional $3.32 million of SARI capacity, assuming that 1.1 mgd of additional RO capacity is required to offset the potential increase in RO/IX raw water TDS assumed in Section 4.3.2.
  - Chino II still requires purchase of an additional $26.03 million of SARI capacity to support the additional RO.
  - Chino II still requires purchase of an additional $3.4 million of SARI capacity to replace the missing 0.3 mgd of SARI treatment capacity that is currently "borrowed" from IEUA to allow operation of the existing Chino II facilities.
- Capital Costs
  - $3.06 million less than Option A.

8.3.3 Option C—Expand Chino II to 22.7 mgd (Including Concentrate Reduction Facilities)

This option leaves Chino I at current capacity and expands Chino II by adding 10.5 mgd of RO/IX capacity to the existing 10 mgd RO/IX capacity. An additional 2.2 mgd of product water capacity is added through construction of concentrate reduction facilities, thus converting concentrate to permeate without increasing the raw water supply requirement. Assumptions include the following.

- Desalter Capacity
  - Chino II is expanded from 10 to 22.7 mgd capacity by adding 4 mgd of IX and 6.5 mgd of RO to the existing capacity plus an additional 2.2 mgd of RO concentrate is converted to permeate through pretreatment and secondary RO (concentrate reduction facilities).
  - Raw water bypass is not included in the 22.7 mgd Chino II capacity but it can be used as part of the capacity to decrease operating costs.
  - Chino I is required to produce at 12 mgd capacity (14.2 mgd less 2.2 Chino II raw water bypass capacity) to meet entitlements.
    - In the event that the CCWF increases the Chino I RO/IX raw water TDS a placeholder of $2.44 million is included for sufficient RO capacity to maintain the current Chino I product water capacity (see Section 4.3.2).

- Raw Water Capacity
  - The same as Option A because the raw water requirement remains the same. The additional 2.2 mgd capacity at Chino II comes from converting concentrate to product water.
- SARI Capacity
  - Chino I requires an additional $3.22 million of SARI capacity, assuming that 1.1 mgd of additional RO capacity is required to offset the potential increase in RO/IX raw water TDS assumed in Section 4.3.2. However, a purchase is not required because excess SARI capacity from Chino II, made available by the concentrate reduction facilities, can be transferred to Chino I. The analysis in the PDR assumes transfer of excess capacity (made available at Chino II by concentrate reduction) to Chino I without cost.
  - Concentrate reduction eliminates the need for SARI capacity purchase for the Chino II expansion.
  - Concentrate reduction eliminates the need to purchase an additional $3.4 million of SARI capacity to replace the missing 0.3 mgd of SARI treatment capacity that is currently "borrowed" from IEUA to allow operation of the existing Chino II facilities.
  - Concentrate reduction allows the sale or transfer of $6.67 million of existing Chino II SARI capacity that is no longer required.
- Capital Costs (assuming transfer of excess SARI capacity from Chino II to Chino I without cost)
  - $18.46 million less than Option A.
  - $15.40 million less than Option B.

A summary of estimated capital costs (in 2009 dollars) for the three options is presented in Table 8.4. We recommend pursuing Option C (Expand Chino II to 22.7 mgd including Concentrate Reduction Facilities) for the reasons stated later in this section. A summary of raw water, product water, and process capacity for the three options is presented in Table 8.5.

Table 8.4 Summary of Phase 3 Project Options Capital Costs
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Option A[a] ($)	Option B[a] ($)	Option C[a] ($)
RAW WATER SYSTEM			
Wells			
CCWF Wells	$18,750,000	$18,750,000	$18,750,000
Chino II Wells II-10, 11, 12, and 13	$0	$13,000,000	$0
Pipelines			
Pipeline from Well CCWFA-6 to Chino I	$1,690,000	$1,690,000	$1,690,000
Chino I/II Raw Water Intertie Pipeline	$5,640,000	$0	$5,640,000
Chino II Well Expansion Raw Water Pipeline	$0	$8,140,000	$0
Raw Water Pump Stations			
Raw Water Intertie Pump Station	$3,580,000	$0	$3,580,000
TREATMENT FACILITIES			
Chino I			
Modifications to achieve Nameplate Capacity	$7,310,000	$0	$0
Modifications to Maintain Current Capacity	$0	$2,440,000	$2,440,000
Chino II			
Phase 3 Expansion (Add 10.5 mgd RO/IX)	$16,890,000	$16,890,000	$16,890,000
Concentrate Reduction Facilities	$0	$0	$30,600,000
PRODUCT WATER SYSTEM			
Pipelines			
Pipeline from Chino II to Riverside Dr./ Hamner Ave.	$7,890,000	$7,890,000	$7,890,000
Pipeline from Riverside Dr./Hamner Ave. to Detroit St.	$16,900,000	$16,900,000	$16,900,000
Product Water Pump Stations			
Chino II: JCSD Zone 1110	$1,030,000	$1,030,000	$1,030,000
Chino II: Ontario/WMWD Zone 1010	$2,580,000	$2,580,000	$2,580,000
Milliken Pump Station	$2,610,000	$2,610,000	$2,610,000
SARI CAPACITY			
Pipelines			
Chino II Brine Pipeline	$1,330,000	$1,330,000	$0
SARI Purchase[b]			
Chino I Additional SARI Pipeline Capacity	$3,340,000	$830,000	$0
Chino I Additional SARI Treatment Capacity	$10,090,000	$2,490,000	$0
Chino II Missing SARI Treatment Capacity	$3,400,000	$3,400,000	$0
Chino II Additional SARI Pipeline Capacity	$6,420,000	$6,420,000	$0
Chino II Additional SARI Treatment Capacity	$19,610,000	$19,610,000	$0
TOTAL	**$129,070,000**	**$126,010,000**	**$110,610,000**

Notes:
a. Capital costs in 2009 dollars represent construction costs (see Appendix G) plus 20 percent engineering (except concentrate reduction is 30 percent) and 5 percent legal/administration costs.
b. SARI pipeline capacity cost = $3.75 million per mgd; SARI treatment capacity = $11.332 million per mgd.

Table 8.5 Summary of Phase 3 Options Capacities
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Option A: 1st Draft Phase 3 PDR	Option B: Chino II Expansion + Bypass	Option C: Chino II Concentrate Reduction
VOLUME			
Chino I			
Raw Water (AF/yr)	16,800	14,100	14,100
Product Water (AF/yr)	14,200	12,300	12,300
Overall Recovery	85%	87%	87%
Operating Factor	89%	91%	91%
Chino II			
Raw Water (AF/yr)	24,000	25,800	24,000
Product Water (AF/yr)	21,000	22,900	22,900
Overall Recovery	88%	89%	95%
Operating Factor	91%	90%	90%
Total CDA			
Raw Water (AF/yr)	40,800	39,900	38,100
Product Water (AF/yr)	35,200	35,200	35,200
Overall Recovery	86%	88%	92%
Operating Factor	90%	90%	90%
FLOW			
Chino I			
Raw Water (mgd)	16.8	13.8	13.8
Product Water (mgd)	14.2	12.0	12.0
IX	2.7	3.8	3.8
RO	10.0	6.7	6.7
VOC	1.5	1.5	1.5
Chino II			
Raw Water (mgd)	23.4	25.6	23.8
Product Water (mgd)	20.5	22.7	22.7
IX	8.0	8.0	8.0
RO	12.5	12.5	14.7
RW Bypass	0.0	2.2	0.0
Total CDA			
Raw Water (mgd)	40.2	39.4	37.6
Product Water (mgd)	34.7	34.7	34.7
PROCESS RECOVERY			
Chino I			
IX Recovery	98%	98%	98%
RO Recovery	80%	80%	80%
Chino II			
IX Recovery	98%	98%	98%
RO Recovery	82%	82%	94%

Option A (Expand Chino II to 20.5 mgd and Modify Chino I to Nameplate Capacity) is recommended as a second choice, if Option C is not selected or is demonstrated to be infeasible based on additional work. Although Option A has a higher capital cost than the remaining Option B (Expand Chino II to 22.7 mgd including Raw Water Bypass) it has the following advantages over Option B.

- Option B reduces the overall production of the existing Chino I wells (including CDA I-13, 14, and 15) by amount of the production of the proposed CCWF wells. This results in a less balanced distribution of groundwater production (i.e., less water is produced from the western Chino I wells and more water is produced from the eastern Chino II wells).
- Under Option A, the product water capacity is less affected by water quality changes. Option B depends upon the raw water bypass to meet entitlements and a decrease in performance of RO or IX processes or an increase in raw water TDS or nitrates would have a greater impact on production capacity at both Chino I and Chino II.
- Option B has less flexibility in the operation of raw water supplies because the Chino I and Chino II raw water systems are kept separate in order to minimize the risk of reducing the Chino II raw water bypass capacity, which is water quality dependent.

8.3.4 Cost Estimates

Capital cost estimates herein are Class IV Budget Estimates as defined by the Association for the Advancement of Cost Engineering (AACE) revised classification (1999) with an expected accuracy of plus 30 to minus 15 percent. Cost estimates are based upon the engineer's perception of current conditions in the project area and are subject to variances in the costs of labor, materials, equipment, and services provided by others as well as economic conditions. The estimates reflect the engineer's professional opinion of accurate costs.

Detailed line item cost estimates for new facilities are included in Appendices G.2 – G.8 of this report. Table 8.6 presents a summary of capital improvement costs for the recommended alternative (Option C) as current (August 2009) dollars and escalated to mid-point of construction.

For reference, summaries of capital improvement costs for Options A and B are included in Appendix G.9.

8.4 OPERATIONS AND MAINTENANCE COSTS

The CDA uses a postage stamp rate concept for distribution of operations and maintenance (O&M) costs among the CDA member agencies. The postage stamp rate means that there is no segregation of facility costs in determining the cost sharing of annual O&M expenses. For example, the costs of operating all CDA-owned product water pump stations are shared equally by all CDA members without regard to the cost of the pump station lift. Similarly, the costs of operating the Chino I and Chino II Desalters are shared by all CDA members.

Table 8.6 Summary of Construction Project Capital Costs for Option C: Expand Chino II to 22.7 mgd with Concentrate Reduction
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Detailed Costs in Appendix	Construction ($)	Contingency and Engineering ($)	(%)	Administrative and Legal ($)	(%)	Aug-09 Dollars Total ($)	Construction Dates Start	Stop	Midpoint	Time to Midpoint From Aug-09 (years)	Escalation Factor [3.0% Annual Inflation]	Constr. Midpoint Dollars Total ($)
RAW WATER SYSTEM													
Wells													
Well CCWFA-1	G.2.1	2,515,000	500,000	20	130,000	5	3,145,000	May-11	Jan-14	Aug-12	3.08	1.10	3,450,000
Well CCWFA-2	G.2.2	2,515,000	500,000	20	130,000	5	3,145,000	May-11	Jan-14	Aug-12	3.08	1.10	3,450,000
Well CCWFA-3	G.2.3	2,580,000	520,000	20	130,000	5	3,230,000	May-11	Jan-14	Aug-12	3.08	1.10	3,540,000
Well CCWFA-4	G.2.4	2,240,000	450,000	20	110,000	5	2,800,000	Sep-09	Jan-12	Nov-10	1.25	1.04	2,910,000
Well CCWFA-5	G.2.5	2,360,000	470,000	20	120,000	5	2,950,000	May-11	Jan-14	Aug-12	3.08	1.10	3,230,000
Well CCWFA-6	G.2.6	2,370,000	470,000	20	120,000	5	2,960,000	Sep-09	Jan-12	Nov-10	1.25	1.04	3,070,000
Monitoring Well	G.2.7	210,000	40,000	20	10,000	5	260,000	Sep-09	Jan-12	Nov-10	1.25	1.04	270,000
Monitoring Well	G.2.8	210,000	40,000	20	10,000	5	260,000	Sep-09	Jan-12	Nov-10	1.25	1.04	270,000
Pipelines													
Pipeline from Well CCWFA-6 to Chino I	G.3.1	1,354,000	270,000	20	70,000	5	1,694,000	Aug-13	Sep-14	Feb-14	4.55	1.14	1,940,000
Raw Water Intertie Pipeline	G.3.2	4,510,000	900,000	20	230,000	5	5,640,000	Sep-10	Nov-11	Apr-11	1.73	1.05	5,940,000
Raw Water Pump Stations													
Raw Water Intertie Pump Station	G.4.1	2,870,000	570,000	20	140,000	5	3,580,000	Sep-10	Nov-11	Apr-11	1.73	1.05	3,770,000
TREATMENT FACILITIES													
Chino I													
Modifications to Maintain Current Capacity	G.5.2	1,950,000	390,000	20	100,000	5	2,440,000	Jun-11	Sep-12	Jan-12	2.46	1.08	2,620,000
Chino II													
10.5 mgd RO/IX Expansion (100% Sponsor)	G.5.3	12,130,000	2,430,000	20	610,000	5	15,170,000	Sep-09	Sep-09	Sep-09		1.00	15,210,000
Transfer Pump Modifications (48.8% CDA/51.2% Sponsors)	G.5.3	780,000	160,000	20	40,000	5	980,000	Sep-09	Sep-09	Sep-09		1.00	980,000
Chemical Modifications (100% CDA)	G.5.3	10,000	0	20	0	5	10,000	Sep-09	Sep-09	Sep-09		1.00	10,000
Spare Parts (100% CDA)	G.5.3	350,000	70,000	20	20,000	5	440,000	Sep-09	Sep-09	Sep-09		1.00	440,000
HVAC Modifications (38% CDA/62% Sponsor)	G.5.3	230,000	50,000	20	10,000	5	290,000	Sep-10	Nov-11	Apr-11	1.73	1.05	310,000
Concentrate Reduction Facilities (100% Sponsor)	Table 5.8	22,670,000	6,800,000	30	1,130,000	5	30,600,000	Sep-10	Nov-11	Apr-11	1.73	1.05	32,210,000
PRODUCT WATER SYSTEM													
Pipelines													
Pipeline from Chino II to Riverside Dr./Hamner Ave.	G.6.1	6,310,000	1,260,000	20	320,000	5	7,890,000	Jan-11	Feb-12	Jul-11	1.99	1.06	8,370,000
Pipeline from Riverside Dr./Hamner Ave. to Detroit St.	G.6.2	13,520,000	2,700,000	20	680,000	5	16,900,000	Jan-11	Feb-12	Jul-11	1.99	1.06	17,920,000
Product Water Pump Stations													
Chino II: JCSD Zone 1110	G.7.1	825,000	170,000	20	40,000	5	1,035,000	Sep-10	Nov-11	Apr-11	1.73	1.05	1,090,000
Chino II: Ontario/WMWD Zone 1010	G.7.2	2,070,000	410,000	20	100,000	5	2,580,000	Sep-10	Nov-11	Apr-11	1.73	1.05	2,720,000
Milliken Pump Station: Ontario Zone 1010 to Zone 1212	G.7.3	2,090,000	420,000	20	100,000	5	2,610,000	Sep-10	Nov-11	Apr-11	1.73	1.05	2,750,000
TOTAL		86,669,000	19,590,000		4,350,000		110,609,000						116,470,000

Because of the postage stamp rate, there is incentive for all CDA members to achieve economies in the operation of CDA-owned facilities. For example, the proposed Chino II product water 1010 zone pump station will operate at a lower unit cost (due to lower lift) than if the Phase 3 expansion entitlement were pumped to the 1110 zone. The cost reduction in pumping to a lower pressure zone is shared by all CDA members.

8.4.1 Pipeline O&M Costs

Pipeline O&M costs include labor and equipment for the following:

- Pipeline locating
- Valve exercising
- Maintenance and repairs

Review of previous CDA budgets shows that annual O&M costs for the existing CDA pipelines are approximately $1 per lineal foot per year. This unit cost has been applied to new pipelines to quantify additional O&M costs resulting from Phase 3 pipeline construction.

8.4.2 Well and Pump Station O&M Costs

Review of previous CDA budgets shows that annual O&M costs for the Chino Desalter wells are approximately $15,000 per well. This unit cost has been applied to new wells and pump stations; it does not included well rehabilitation or pump repairs or extraordinary maintenance.

Energy costs for additional raw water production are calculated as shown in Table 8.7.

Table 8.7 Raw Water Pumping Costs
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

Description	Chino I	Chino II
Electrical Costs for Wells ($)	610,340	779,424
Volume (AF) [a]	13,980	13,980
Unit Cost ($/AF)	43	55

Source: CDA Spreadsheet "FY 09-10 Budget Final"

a. Volume is budgeted product water (12,300 AF) for Chino I and Chino II divided by overall plant recovery of 88 percent.

Energy costs for offsite product water pump stations are calculated based upon design TDH and flow with an assumed wire-to-water efficiency of 75 percent. Energy costs for Chino II onsite product water pumping are included in the treatment plant O&M costs as variable costs, based upon historical pumping to the 1110 zone, and adjusted as appropriate for pumping to other pressure zones.

8.4.3 Treatment Plant O&M Costs

The annual O&M costs are divided between fixed costs, which are independent of volume treated, and variable costs, which are dependent upon volume treated. CDA has determined that the split between fixed and variable O&M costs for the existing Chino Desalters is 43 percent fixed costs and 57 percent variable costs.

Unit O&M costs ($/AF) for the operation of the expanded Chino II Desalter are calculated as the sum of constant fixed costs plus pro-rated variable costs divided by total volume treated. As a result, any increase in volume treated through the existing Chino Desalters results in a reduction of unit cost because the fixed costs are spread over a larger volume of water.

It is understood that fixed costs will increase due to the additional equipment added by the Phase 3 expansion. In order to adjust the fixed costs at the existing desalters to reflect the additional expenses resulting from the addition of equipment necessary for expansion, a percentage of added equipment cost is included to represent annual equipment O&M and reserves for eventual replacement of IX resin and RO elements.

Concentrate disposal at the existing Chino Desalters is included in the treatment plant O&M costs as variable costs. As discussed in Section 5, a market survey for the pellets produced by the concentrate reduction process identified a market demand for the pellets with sale prices for the pellets ranging from $10 – $20 per ton. The market survey is included in Appendix E.3. Table 8.8 uses the low range pellet sale value ($10/ton) to be conservative.

A summary of O&M costs resulting from the implementation of Option C of the Chino Desalter Phase 3 project is shown in Table 8.8. This table assumes that the project costs are imposed upon the present (FY 09-10) CDA budget; in other words, the O&M costs are shown in current dollars.

The projected impacts of the recommended Phase 3 expansion project (Option C) on the current baseline CDA O&M budget (FY 09-10), as shown in Table 8.8, will decrease the CDA O&M costs by 0.8 percent from the current baseline level.

Because the impact on O&M costs is a critical issue to CDA members, the Phase 3 project Sponsors commissioned an independent review of O&M costs by a separate consultant (RBF Consulting); a copy is included in Appendix G.10. The conclusion of the independent review was that O&M costs would increase by 5.5. percent from the current baseline level for Option C. However, this analysis was completed prior to the pellet market survey and assumes a $30/ton disposal cost for pellets. Using the low range pellet sale value of

$10/ton proposed under Option 3 of the market survey, instead of the disposal cost assumed before the market survey, the increase in O&M calculated by the independent review would be 2 percent instead of 5.5 percent.

For reference, summaries of O&M costs for Options A and B are included in Appendix G.9.

Table 8.8 Summary of O&M Costs for Option C (Expand Chino II to 22.7 mgd with Concentrate Reduction)
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Change in Variable Costs				Change in Fixed Costs				
	Quantity	Units	Unit Cost	Annual Cost	Quantity	Units	Unit Cost	Annual Cost	Total Cost
OFF-SITE BUDGET ADJUSTMENT									
Energy									
Additional Pumping Cost of Chino II Raw Water Supply (Higher Head) [a]	23,860	AF/yr	$5.58	$134,000					
Milliken Pump Station [b]	3,500	AF/yr	$46.00	$161,000					
Maintenance									
Pipeline (RW) from Well CCWFA-6 to Chino I					7,700	LF	$1	$8,000	
Pipeline (RW) Chino II Well Field Extension (Intertie)					14,770	LF	$1	$15,000	
Pipeline (PW) from Chino II to Riverside Dr./Hamner Ave.					32,740	LF	$1	$33,000	
Pump Station Chino I-Chino II Raw Water Intertie					1	ea	$15,000	$15,000	
Pump Station Chino II (Zone 1010)					1	ea	$15,000	$15,000	
Pump Station Chino II (Zone 870)					0	ea	$15,000	$0	
Pump Station Milliken Res - Ontario (Zone 1010 to Zone 1212)					1	ea	$15,000	$15,000	
Wells (CCWF)					6	ea	$15,000	$90,000	
Off-site Budget Adjustment Subtotal				$295,000				$191,000	$486,000
ON-SITE BUDGET ADJUSTMENT									
Chino II Expansion Additional Equipment Maintenance/Reserves [c]								$160,000	
870 Zone Product Water Pumping -- Cost Reduction [d]									
JCSD	0	AF/yr	$0	$0					
1010 Zone Product Water Pumping -- Cost Reduction [d]									
Ontario	7,033	AF/yr	$16	($118,000)					
Norco	1,000	AF/yr	$16	($16,000)					
WMWD	3,534	AF/yr	$16	($60,000)					
Cost of Reduced Raw Water Bypass [e]	1,230	AF/yr	$152	$187,000					
Cost of Operating Concentrate Reduction [f]				$1,690,000					
On-site Budget Adjustment Subtotal				$1,683,000				$160,000	$1,843,000
TOTAL CDA BUDGET									
Base Budget (24,600 AF of Product Water) [g]	24,600	AF/yr	$310	$7,636,386	24,600	AF/yr	$234	$5,760,783	$13,397,169
Phase 3 Expansion (10,600 AF of Product Water)	10,600	AF/yr	$310	$3,290,475					$3,290,475
Off-Site Budget Adjustment Subtotal				$295,000				$191,000	$486,000
On-Site Budget Adjustment Subtotal				$1,683,000				$160,000	$1,843,000
Total New Budget				$12,904,862				$6,111,783	$19,016,644

Notes:

a. Based on 10 percent average increase in well TDH resulting from greater flow in Chino II raw water pipelines.
b. Based on 230 feet design TDH at the Milliken Pump Station and energy cost of $20/AF per 100 feet of lift. Assumes pumping of the entire Ontario Phase 3 Expansion entitlement from the 1010 zone to the 1212 zone.
c. Based on 2 percent of $8 million estimated equipment cost for annual O&M and reserve fund RO membrane and IX resin replacement.
d. CDA FY09/10 budget variable unit costs include product water pumping to 1110 zone. Cost reduction represents product water pumping to a lower zone (see Table 6.2).
e. Reduction in raw water bypass volume is 5 percent (based on increased TDS from Wells I-13, 14, and 15). Unit cost of treatment is assumed as FY 09/10 budget Chino II on-site total variable cost ($218/AF) less cost of product water pumping to the 1110 zone (330 feet lift at $20/AF per 100 feet of lift).
f. Difference between operation costs without concentrate reduction ($920,000) and with concentrate reduction ($2,610,000) from Table 5.10.
g. Base Budget is the FY09/10 Final budget with a total on-site + off-site cost of $13,397,169 for delivery of 24,600 AF of product water. Fixed Costs = 43%, Variable Costs = 57%.

8.5 FUNDING AND COST OFFSETS

Several methods of reducing the cost impact of construction and operation were used in the Phase 1 and 2 Chino Desalter projects. The same cost reduction methods of grant funding and operating cost offsets will be used in the Phase 3 expansion project.

8.5.1 Grant Funding

Grant funding for the Chino Desalter Phase 3 project is available using both State and Federal programs. Because there is no repayment obligation for the grant funding, it is shown as an offset to the capital cost of the project prior to calculation of the debt service.

Grant funding, both approved and pending, is summarized in Table 8.9.

Table 8.9 Grant Funding
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	($Million)
Approved Grants	
State Water Resources Control Board/ARRA[a]	$5.0
CA Department of Water Resources[a]	$2.8
CA Department of Public Health[a]	$20
Pending Grants	
CA Department of Public Health[a]	$20-40
HR 146[b]	$26
Total Potential Grants	**$73.8 - 93.8**

Notes:
a. 50 percent matching grant (no grant repayment obligation).
b. 25 percent grant/75 percent Sponsor funding (no grant repayment obligation).

8.5.2 MWD LRP Funding

The Metropolitan Water District of Southern California (MWD) encourages development of local water supplies through Local Resource Program (LRP) funding. The LRP funds are collected by MWD through a surcharge on the sale of water. It is anticipated that product water from the Phase 3 project will qualify for a $139/AF LRP rebate.

Current terms for the LRP funding program terminate the rebate after a period not to exceed 25 years. The LRP funding is also reduced so as not to exceed the calculated

difference between the cost of water produced from the Phase 3 project Desalter facility and the cost of MWD's prevailing full service treated water rate for the same year.

8.5.3 Groundwater Replenishment

The Chino Basin Watermaster administers the use of groundwater throughout the Chino Basin, including groundwater withdrawals for treatment in the Chino Desalters. There are no appropriative rights associated with the Chino Desalters; therefore, the groundwater treated in the desalters must be replaced, which means it must be replenished by purchase of MWD water for use in groundwater recharge. Replenishment is an obligation of the Appropriative Pool.

In order to encourage withdrawal of groundwater for treatment in the desalters, the current practice is to "forgive" the replenishment cost for groundwater pumped to the Chino desalters. Forgiveness is anticipated to continue until a cumulative total of 400,000 AF of groundwater has been treated at the desalters, after which it is possible that the Appropriative Pool may share replenishment responsibility with the CDA.

Replenishment costs and associated assessments fluctuate, but current costs are as follows:

- Replenishment Water = $380 per AF
- Administration Assessment = $7.19 per AF
- OBMP Assessment = $44.02 per AF
- Total CBWM Assessment = $431.21 per AF

(Source: e-mail from Chino Basin Watermaster; January 6, 2010)

8.6 SUMMARY OF COSTS

Capital costs for the construction of the Option C Phase 3 project elements, escalated to individual project element construction mid-point, have been presented previously. These escalated capital costs are distributed to the Phase 3 Sponsors in Table 8.10. The table also includes non-construction capital expenses such as SARI pipeline and treatment capacity purchases.

For reference, summaries of capital cost distributions for Options A and B are included in Appendix G.9.

Table 8.10 Capital Cost Distribution for Option C (Expand Chino II to 22.7 mgd with Concentrate Reduction)
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Chino Phase 3 Sponsors						Non-Sponsors									
	Ontario		JCSD		Western		Chino		Chino Hills		Norco		SARWC		TOTAL [a]	
PRODUCT WATER ALLOCATION																
Phases 1 and 2 (Acre-Feet/Year)	20%	5,000	33%	8,200	0%	0	20%	5,000	17%	4,200	4%	1,000	5%	1,200	100%	24,600
Phase 3 (Acre-Feet/Year)	33%	3,533	33%	3,533	33%	3,534	0%	0	0%	0	0%	0	0%	0	100%	10,600
Total (Acre-Feet/Year)	24%	8,533	33%	11,733	10%	3,534	14%	5,000	12%	4,200	3%	1,000	3%	1,200	100%	35,200
RAW WATER SYSTEM CAPITAL COSTS:																
Wells:																
Wells CCWFA-1, 2, 3, 4, 5, and 6 + Monitoring Wells	33%	$6,729,365	33%	$6,729,365	33%	$6,731,270	0%	$0	0%	$0	0%	$0	0%	$0	100%	$20,190,000
Pipelines:																
Raw Water Pipeline from Well CCWFA-6 to Chino I	33%	$646,606	33%	$646,606	33%	$646,789	0%	$0	0%	$0	0%	$0	0%	$0	100%	$1,940,000
Raw Water Intertie Pipeline	33%	$1,979,813	33%	$1,979,813	33%	$1,980,374	0%	$0	0%	$0	0%	$0	0%	$0	100%	$5,940,000
Raw Water Pump Station																
Raw Water Intertie Pump Station	33%	$1,256,548	33%	$1,256,548	33%	$1,256,904	0%	$0	0%	$0	0%	$0	0%	$0	100%	$3,770,000
WATER TREATMENT FACILITIES CAPITAL COSTS:																
Chino I Modifications to Maintain Current Capacity (100% Sponsors)	33%	$873,251	33%	$873,251	33%	$873,498	0%	$0	0%	$0	0%	$0	0%	$0	100%	$2,620,000
Chino II 10.5 mgd RO/IX Expansion (100% Sponsors)	33%	$5,069,522	33%	$5,069,522	33%	$5,070,957	0%	$0	0%	$0	0%	$0	0%	$0	100%	$15,210,000
Chino II Transfer Pumps (48.8% CDA/51.2% Sponsors)	27%	$264,441	33%	$326,651	17%	$167,285	10%	$97,203	8%	$81,651	2%	$19,441	2%	$23,329	100%	$980,000
Chino II Chemical System Modifications (100% CDA)	24%	$2,424	33%	$3,333	10%	$1,004	14%	$1,420	12%	$1,193	3%	$284	3%	$341	100%	$10,000
Chino II Spare Parts (100% CDA)	24%	$106,663	33%	$146,663	10%	$44,175	14%	$62,500	12%	$52,500	3%	$12,500	3%	$15,000	100%	$440,000
HVAC Modifications (38% CDA/62% Sponsors)	28%	$88,004	33%	$103,327	21%	$64,079	8%	$23,943	6%	$20,112	2%	$4,789	2%	$5,746	100%	$310,000
Concentrate Redution Facilities (100% Sponsors)	33%	$10,735,654	33%	$10,735,654	33%	$10,738,692	0%	$0	0%	$0	0%	$0	0%	$0	100%	$32,210,000
PRODUCT WATER SYSTEM CAPITAL COSTS:																
Pipelines:																
Pipeline from Chino II to Riverside Dr./Hamner Ave. (Ontario Zone 1010)	61%	$5,089,151	0%	$0	39%	$3,280,849	0%	$0	0%	$0	0%	$0	0%	$0	100%	$8,370,000
Pipeline from Riverside Dr./Hamner Ave. to Detroit St.	0%	$0	0%	$0	100%	$17,920,000	0%	$0	0%	$0	0%	$0	0%	$0	100%	$17,920,000
Pump Stations:																
Chino II - JCSD Product Water (Clearwell to Zone 1110)	0%	$0	100%	$1,090,000	0%	$0	0%	$0	0%	$0	0%	$0	0%	$0	100%	$1,090,000
Chino II - Ontario/Western Product Water (Clearwell to Zone 1010)	61%	$1,653,822	0%	$0	39%	$1,066,178	0%	$0	0%	$0	0%	$0	0%	$0	100%	$2,720,000
Milliken Res - Ontario (Zone 1010 to Zone 1212)	100%	$2,750,000	0%	$0	0%	$0	0%	$0	0%	$0	0%	$0	0%	$0	100%	$2,750,000
Capital Costs Subtotal		**$37,245,263**		**$28,960,732**		**$49,842,053**		**$185,067**		**$155,456**		**$37,013**		**$44,416**		**$116,470,000**
Less Approved Grant Funding	32%	($8,922,324)	25%	($6,937,716)	43%	($11,939,960)		$0		$0		$0		$0		($27,800,000)
Adjusted Capital Costs		**$28,322,939**		**$22,023,017**		**$37,902,092**		**$185,067**		**$155,456**		**$37,013**		**$44,416**		**$88,670,000**
30 Year Amortization Period																
5.0% Fixed Amortization Rate																
ANNUALIZED CAPITAL ($/YEAR)		**$1,842,448**		**$1,432,629**		**$2,465,586**		**$12,039**		**$10,113**		**$2,408**		**$2,889**		**$5,768,111**

Notes:
a. Capital costs are construction costs plus engineering/contingency and legal/administration costs escalated to construction midpoint.

The table includes the percent of each itemized capital cost that is shared by the Sponsors. Other costs, such as Chino II spare parts, are shared by all CDA members. In each case, the capital cost sharing is based upon Sponsor or non-Sponsor CDA member entitlement volumes.

The annualized capital cost (i.e., debt service) for Option C is added to the existing CDA debt service in Table 8.11, which also includes the Option C O&M costs resulting from the Phase 3 project. This table uses the same format as the present CDA FY 09-10 budget summary to show both the present (original) budget and the modified (new) budget with the Phase 3 expansion costs, both debt service and O&M, added to the CDA budget in today's dollars.

For reference, summaries of CDA unit costs for Options A and B are included in Appendix G.9.

The unit costs presented in Table 8.11 for Option C, and in Appendix G.9 for Options A and B, show both O&M and debt service costs for the CDA member agencies using the current budget format of the CDA. However, these costs do not reflect the value of the Chino Watermaster replenishment assessment, which represents a true cost of desalter operation whether currently included in the unit cost paid directly by the CDA members or not.

Replenishment costs represent a differentiator between the three desalter expansion options. The recommended option, Option C, produces the same annual volume of product water while requiring 1,800 AF/yr less raw water than Option B and 2,700 AF/yr less raw water than Option A. This differential in raw water requirement is due to the fact that the concentrate reduction process of Option C converts RO concentrate waste into permeate without requiring additional raw water.

Table 8.12 shows unit costs (O&M plus debt service) with an adjustment to include the avoided raw water unit pumping cost and groundwater replenishment assessment. In addition, Table 8.12 shows two separate columns for Option C unit costs to represent the range of potential O&M costs due to the range of sale values of the calcium carbonate pellets produced by the concentrate reduction process (see Appendix E.3, Option 3). The O&M cost data presented previously in Tables 8.8 and 8.11 are based upon the more conservative (low range) assumption for the pellet disposal costs.

Table 8.11 **Original and New CDA Costs (FY 09/10 Budget Year) For Option C (Expand Chino II to 22.7 mgd with Concentrate Reduction)**
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

	Original CDA Entitlement		New CDA Entitlement		Fixed Project Cost [a]	Fixed Proj Costs	New Debt Service [b]	Fixed O&M		Variable O&M		Total Cost		Less MWD Rebate [d]		Net Cost		Net Unit Cost	
								Original	New	Original	New	Original	New	Original	New	Original	New	Original	New
	(AF/yr)	(%)	(AF/yr)	(%)	($)	Non-debt ($)	($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($)	Cost ($/AF)	Cost ($/AF)
JCSD	8,200	33.3%	11,733	33.3%	$ 2,214,774	$122,745	$1,432,629	$1,920,261	$2,037,203	$2,545,462	$4,301,498	$ 6,803,242	$ 10,108,850	$1,139,800	$1,630,887	$5,663,442	$8,477,963	691	723
Ontario	5,000	20.3%	8,533	24.2%	1,492,617	74,845	1,842,448	1,170,891	1,481,586	1,552,111	3,128,329	4,290,463	8,019,825	695,000	1,186,087	3,595,463	6,833,738	719	801
WMWD	-	0.0%	3,534	10.0%			2,465,586	-	613,609	-	1,295,619	-	4,374,813	-	491,226	-	3,883,587	-	1099
Chino	5,000	20.3%	5,000	14.2%	1,534,568	74,845	12,039	1,170,891	868,151	1,552,111	1,833,077	4,332,414	4,322,679	695,000	695,000	3,637,414	3,627,679	727	726
Chino Hills	4,200	17.1%	4,200	11.9%	1,287,671	62,869	10,113	983,548	729,247	1,303,773	1,539,785	3,637,862	3,629,685	583,800	583,800	3,054,062	3,045,885	727	725
SARWC	1,200	4.9%	1,200	3.4%	365,722	17,963	2,889	281,014	208,356	372,507	439,938	1,037,206	1,034,869	166,800	166,800	870,406	868,069	725	723
Norco	1,000	4.1%	1,000	2.8%	309,023	14,969	2,408	234,178	173,630	310,422	366,615	868,593	866,646	139,000	139,000	729,593	727,646	730	728
Total	24,600	100%	35,200	100%	$7,204,376	$368,235	$5,768,111	$5,760,783	$6,111,783	$7,636,386	$12,904,862	$20,969,780	$32,357,366	$3,419,400	$4,892,800	$17,550,380	$27,464,566	713	780
F/V O&M								43%		57%									
Unit Cost ($ Per AF)					293	15	164	234	174	310	367	852	919	139	139	713	780		

Original CDA Member Debt Service [c]

	Allocation %	Debt Service 2008 Bond	Other Expenses	Total Fixed Project Cost
JCSD	39.1%	$2,201,469	$ 13,305	$ 2,214,774
Chino	26.8%	1,525,456	9,112	1,534,568
Ontario	0.0%	1,492,617	-	1,492,617
Chino Hills	22.5%	1,280,025	7,646	1,287,671
SARWC	6.4%	363,538	2,184	365,722
Norco	5.3%	307,213	1,810	309,023
	100.0%	$ 7,170,318	$ 34,058	$ 7,204,376

Original FY09/10 Budget

Onsite O&M	$10,565,116
Offsite O&M	$2,832,053
	$13,397,169

Notes:

a. Original CDA Budget: Fixed Project Cost Allocation plus Ontario (separate financing from CDA budget)
b. Includes non-Phase 3 project costs (e.g., Chino II transfer pumps, Chino I nameplate modifcations, etc.) for non-Sponsor CDA members.
c. Original CDA Budget: Debt Service based on 'level' plan - 2008 Bonds.
d. $139/AF for all product water (Source: Jack Safely e-mail 10/29/10).

Table 8.12 Summary of Unit Costs (Includes O&M and Debt Services)
Chino Desalter Phase 3 PDR
JCSD/Ontario/WMWD

		Chino Desalter Phase 3 Expansion Options			
	Original [a]	Option A [b]	Option B [c]	Option C Worse Case [d]	Option C Better Case [e]
ESTIMATED UNIT COSTS OF CDA ENTITLEMENT [f]					
JCSD ($/AF)	$691	$716	$697	$698	$694
Ontario ($/AF)	$719	$806	$785	$776	$772
WMWD ($/AF)	$0	$1,162	$1,132	$1,074	$1,070
Chino ($/AF)	$727	$696	$680	$701	$697
Chino Hills ($/AF)	$727	$695	$680	$700	$696
SARWC ($/AF)	$725	$693	$678	$699	$695
Norco ($/AF)	$730	$698	$682	$703	$699
CDA Average ($/AF)	**$713**	**$776**	**$756**	**$755**	**$751**
CHANGE FROM ORIGINAL UNIT COST [a]					
JCSD ($/AF)	$0	$26	$6	$7	($3)
Ontario ($/AF)	$0	$87	$66	$57	$53
WMWD ($/AF)	$0	$1,051	$1,021	$963	$959
Chino ($/AF)	$0	($32)	($47)	($27)	($31)
Chino Hills ($/AF)	$0	($32)	($47)	($27)	($31)
SARWC ($/AF)	$0	($32)	($47)	($27)	($31)
Norco ($/AF)	$0	($32)	($47)	($27)	($31)
CDA Average ($/AF)	**$0**	**$63**	**$43**	**$42**	**$38**

Notes:
a. Original unit costs are from CDA FY 2009-10 budget except LRP has been changed from $250 to $139/AF per Jack Safely e-mail 10/29/10.
b. Chino I modified to 14.2 mgd nameplate capacity + expansion of Chino II to 20.5 mgd.
c. Expansion of Chino II to 22.7 mgd including raw water bypass.
d. Expansion of Chino II to 22.7 including concentrate reduction. Pellet sale value = $10/ton per pellet market survey Option 3; low range sale price. See Appendix E.3.
d. Expansion of Chino II to 22.7 including concentrate reduction. Pellet sale value = $20/ton per pellet market survey Option 3 – high range sale price. See Appendix E.3.
f. Unit Costs represent CDA O&M plus debt service.

Given the information available at the present time, Option C is the recommended alternative for desalter expansion for the following reasons:

- It provides equal product water as the other options while requiring approximately 5 percent less raw water.
- In comparison to Option B, it shifts groundwater withdrawal away from Chino II and relies less on the higher quality groundwater pumping necessary to operate the raw water bypass as part of the entitlement production.
- It reduces the requirement for SARI waste capacity, which frees up capacity in the SARI pipeline for other projects or uses.

On the last point, it should be noted that the economic analysis presented herein does not incorporate the potential sale value of the existing SARI capacity at Chino II that is made available by the concentrate reduction process. At current replacement costs the value of the existing SARI capacity at Chino II made available for sale or transfer is $6,670,000.

Our provisional recommendation of Option C is based upon assumptions stated in Section 5 and information available at the present time. We recommend taking the additional investigation steps listed at the conclusion of Section 5 as a condition of pursuing Option C.